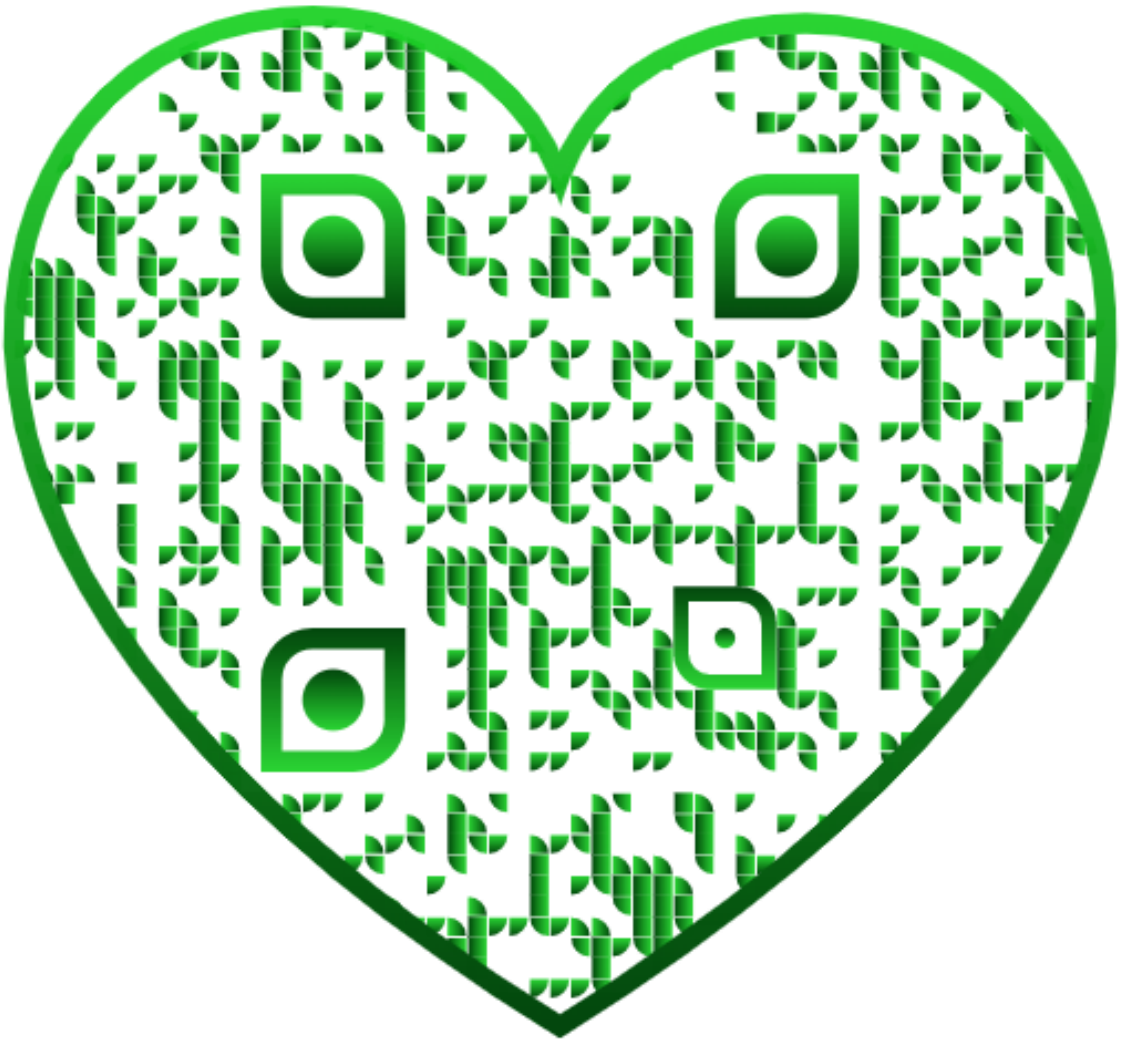
# PHA 489 PHARMACEUTICAL TECHNOLOGY-III

1th WEEK



# IMPORTANCE OF THE MICROMERITICS:

- Knowledge and control of the size and the size range of particles are of profound importance in pharmacy. thus, size, and hence surface area, of a particle can be related in a significant way to the physical, chemical, and pharmacologic properties of a drug.

- Clinically, the particle size of a drug can affect its release from dosage forms that are administrated orally, parenterally, rectally, and topically.
- The successful formulation of suspensions, emulsions, and tablets, form the viewpoints of both physical stability and pharmacologic response, also depends on the particle size achieved in the product.

- In the area of tablet and capsule manufacture, control of the particle size is essential in achieving the necessary flow properties and proper mixing of granules and powders.

- Both tablets and capsules are produced using equipment that controls the mass of drug and other particles by volumetric filling. Therefore, any interference with the uniformity of fill volumes may alter the mass of drug incorporated into the table or capsule and hence reduce the content uniformity of the medicine.

- Powders with different particle sizes have different flow and packing properties, which alter the volumes of powder during each encapsulation or tablet compression event.
- In order to avoid such problems, the particle sizes of drug and other powder may be defined during formulation so that problems during production are avoided.

# General properties of powders:

1) Particle size and size distribution
2) Particle shape and surface area
3) Packing arrangements
4) Flow properties
5) Porosity
6) Solubility and dissolution properties
7) Compression and compaction properties
8) Segregation and agregation properties

# ❖ PARTICLE SIZE

- The size of a sphere is readily expressed in terms of its diameter.
- As a degree of asymmetry of particles increases, however, so does the difficulty of expressing size in terms of a meaningful diameter. Under these conditions, there is no one unique diameter for a particle.

# ❖PARTICLE SIZE DISTRIBUTION

- A particle population which consists of spheres or equivalent spheres of the same diameter is said to be “monosized” and its characteristics can be described by a single diameter or equivalent diameter.
- However, it is unusual for particles to be completely monosized and such a sample will rarerly, if ever, be seen in pharmaceutical system.

- Most powders contain particles with a range of different equivalent diameters. In order to be able to define a size distribution or compare the characteristics of two or more powders consisting of particles with many different diameters, the size distribution can be broken down into different size ranges, which can be presented in the form of a histogram.

# ❖PARTİCLE SİZE ANALYSİS METHODS

- In order to obtain equivalent diameters with which to interpret the particle size of a powder, it is necessary to carry out a size analysis using one or more different methods.
- Particle size analysis methods can be divided into different categories based on several different criteria: microscopy, sieving, sedimentation, or the determination of particle volume.

- Particle size analysis methods and the principles of these different methods is given in the below table.

| METHOD | PRINCIPLE OF THE METHOD | PARAMETER / DISTIRIBUTION |
|---|---|---|
| Sieve Method<br><br>Optical Microscopy | Geometric | Sieve Diameter / Weight<br>Martin's, Feret's and Projected area Diameter / Number |
| Sedimentation | Hydrodynamics | Stokes Diameter / Weight |
| Coulter Counter | Volume | Volume Diameter / Number |
| Laser Light-Scattering | Light Scattering | Volume Diameter / Weight |
| Air Permability<br>Adsorption | Surface Properties | Surface Diameter |
| Photon-Correlation Spectroscopy | Brown Motion | Stokes Diameter |